Notes to CDMS Cabling Schematic Diagram

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1a. **Data Acquisition Cable Assembly** (Inside the RFI/EMI Enclosure): 42 required.
Fermilab Drawing: CDMS Data Acquisition Cable (inside the RF Enclosure)
Cable: 12 twisted pair, 24 AWG, Zo = 100 ohms, 13.5 pF/ft, individually shielded pairs with overall shield, Belden Part # 9734.
Note; Because Belden Part # 9734 has a diameter too large for the AMP, Cable strain relief, Belden Part # 89734 should be used instead. Belden Part #89734 has similar electrical characteristics; is Plenum rated and has a cable diameter, which will fit the AMP Part# 745173-1, cable strain relief.
Connectors: AMP DB25 (Amp Part # 207463-1) with a metal shell (Amp Part #'s 745173-1) and socket contacts (Amp Part #'s 66505-3) on each end.
Signal: DC to 2 MHz. (Consists of a detector electronics signals having a 200 nSecond Rise-times).
Length: 25 feet

1b. **Data Acquisition Cable Assembly** (Outside the RFI/EMI Enclosure): 42 required.
Fermilab Drawing: CDMS Data Acquisition Cable (outside the RF Enclosure)
Cable: 12 twisted pair, 24 AWG, Zo = 100 ohms, 13.5 pF/ft, individually shielded pairs with overall shield, Belden Part # 9734.
Note; Because Belden Part # 9734 has a diameter too large for the AMP, Cable strain relief, Belden Part # 89734 should be used instead. Belden Part #89734 has similar electrical characteristics; is Plenum rated and has a cable diameter, which will fit the AMP Part# 745173-1, cable strain relief.
Connectors: AMP DB25 (Amp Part # 207463-1) with a metal shell (Amp Part #'s 745173-1) and socket contacts (Amp Part #'s 66505-3) on one end and AMP DB25 (Amp Part # 207464-1) with a metal shell (Amp Part #'s 745173-1) and pin contacts (Amp Part #'s 66507-3) on the other.
Signal: DC to 2 MHz. (Consists of a detector electronics signals having a 200 nSecond Rise-times).
Length: 15 feet.

1c. **Data Acquisition Cable, RFI/EMI Enclosure Filter:** (Spectrum Control Inc. type B, 375 pF,, Part # 56-725-064) 42 required + 6 Spares.
Fermilab Drawing # XXXX-MD-387302 Rev. A
These connectors are to be mounted on a 3/16" brass plate, which is 24" horizontally and 18" vertically, in eight rows of 6. The lower-most seven rows are assigned to the seven detector columns. The top row is for spares. The connector shell is electrically bonded to the brass plate. These connectors are to be mounted so that the pin contacts are on the inside of the RFI/EMI Enclosure, and the contact sockets are on the outside.
Signal: DC to 2 MHz. (Consists of a detector electronics signals having a 200 nSecond Rise-times).

2a.a. **DC power Cable Assembly:** (Inside the RFI/EMI Enclosure): 4 required
Fermilab Drawing: CDMS: ZIP Crate to Lindgren Filter DC Power Cable
Cable: 6 conductors of 8 AWG (Belden Part # 9908), 84 strands of AWG 27, tinned copper, PVC insulated.
Connectors: AMP Part # 324082 connected to crate tabs at one end, AMP Part # 324045 connected to filter at RFI/EMI Enclosure wall.
Voltages and Currents: +15 Volts at 15 mA, +15 Volts at 15 Amps and –15Volts at 15 Amps. AWG 8 wire has a resistance of 0.628 milliohms per foot. At 11 amperes, 80 feet of this wire developes a voltage drop of 0.553 volts.
Length: As per Fermilab Drawing

2a.b. **DC Power Cable Assembly**(Outside the RFI/EMI Enclosure): 4 required
Fermilab Drawing: CDMS: ZIP Power Supply to Lindgren Filter DC Power Cable
Cable: 6 conductors of 8 AWG (Belden Part # 9908), 84 strands of AWG 27, tinned copper, PVC insulated.
Connectors: Amphenol Model # 97-3106A-24-10P at one end; AMP Part # 324045 connected to filter at RFI/EMI Enclosure wall.
Voltages and Currents: +15 Volts at 15 mA, +15 Volts at 15 Amps and –15Volts at 15 Amps. AWG 8 wire has a resistance of 0.628 milliohms per foot. At 11 amperes, 80 feet of this wire developes a voltage drop of 0.553 volts.
Length: 25 feet.

2b.a**. DC Power Cable Assembly** (Inside the RFI/EMI Enclosure): 4 required
Fermilab Drawing: CDMS ZIP Crate to Lindgren Filter DC Power Cable
Cable: 6 conductors of 8 AWG (Belden Part # 9908), 84 strands of AWG 27, tinned copper, PVC insulated.
Connectors: AMP Part # 324082 connected to crate tabs at one end, AMP Part # 324045 connected to filter at RFI/EMI Enclosure wall.
Voltages and Currents: +5 Volts at 11 Amps., +15 Volts at 15 Amps and –15Volts at 15 Amps. AWG 8 wire has a resistance of 0.628 milliohms per foot. At 11 amperes, 80 feet of this wire developes a voltage drop of 0.553 volts.
Length: As per Fermilab Drawing

2b.b. **DC Power Cable Assembly**(Outside the RFI/EMI Enclosure): 4 required.
Fermilab Drawing: CDMS ZIP Power Supply to Lindgren Filter DC Power Cable
Cable: 6 conductors of 8 AWG (Belden Part # 9908, 84 strands of AWG 27, tinned copper, PVC insulated).
Connectors: Amphenol Model # 97-3106A-24-10P at one end; AMP Part # 324045 connected to filter at RFI/EMI Enclosure wall.
Voltages and Currents: +5 Volts at 11Amps., +15 Volts at 15 Amps and –15Volts at 15 Amps. AWG 8 wire has a resistance of 0.628 milliohms per foot. At 11 amperes, 80 feet of this wire developes a voltage drop of 0.553 volts.
Length: 25 feet

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2c. **DC Power Cable, RFI/EMI Enclosure Filter:** 24 required.
Fermilab Drawing # XXXX-MD-387300
These filters are to be mounted directly on the outside of the RFI/EMI Enclosure wall. The filter is the **Lindgren # LRX-2030-S1**, (5 milliohm per line)or the **Corcom Facility filter, Part # CDSUW-2030-A6-C**. There is one filter per pair of conductors in 2a.a, 2a.b, 2b.a and 2b.b. These filters are dual line units, rated for 120VAC at 30 Amperes. The stop band is 14kHz to 1GHz with 100 dB insertion loss.

3a. **DC Voltage and Current Sense Cable**(Inside the RFI/EMI Enclosure): 4 required.
Fermilab Drawing: CDMS DC Voltage Sense Cable (inside the RF Enclosure)
Cable: 18 twisted pair, 24 AWG(7x32), 24 ohms/1000', Zo = 100 ohms, 12.5 pF/ft, individually shielded pairs with overall shield, Belden Part # 8118.
Connectors: AMP DB37 (Amp # 205209-2) with metal shell (Amp Part # 745174-2), socket contacts (Amp Part # 66505-3) on one end and AMP DB37 (Amp # 205210-2) with metal shell (Amp Part # 745174-2), pin contacts (Amp Part # 66507-3) on the other end.
Signal: DC to 100 kHz.
Length: 25 feet.

3b. **DC Voltage and Current Sense Cable:** (Outside the RFI/EMI Enclosure): 4 required.
Fermilab Drawing: CDMS DC Voltage Sense Cable (outside the RF Enclosure)
Cable: 18 twisted pair, 24 AWG(7x32), 24 ohms/1000', Zo = 100 ohms, 12.5 pF/ft, individually shielded pairs with overall shield, Belden Part # 8118
Connectors: AMP DB37 (Amp # 205209-2) with metal shell (Amp Part # 745174-2), socket contacts (Amp Part # 66505-3) on one end and AMP DB37 (Amp # 205210-2) with metal shell (Amp Part # 745174-2), pin contacts (Amp Part # 66507-3) on the other end.
Signal: DC to 1 kHz.
Length: 20 feet.

3c. **DC Voltage and Current Sense Cable, RFI/EMI Enclosure Filter:** (Spectrum Control Inc. type E, 4000 pF, Part # 56-735-005). 4 required + 1 Spare.
Fermilab Drawing # XXXX-MC-387301 Rev. A
These connectors are to be mounted on a 3/16" brass plate in a single row of 5. The rightmost filter is a spare. The connector shell is electrically bonded to the brass plate. These connectors are to be mounted so that the pin contacts are on the inside of the RFI/EMI Enclosure, and the contact sockets are on the outside.
Signal: DC to 1 kHz.

4. **Detector Cable Assembly**(Inside the RFI/EMI Enclosure): (Black Box Part # CBCC31212) 42 required
Fermi Drawing: CDMS ZIP To E-STEM Cable
Cable: 25 twisted pair, 24 AWG, individually shielded pairs with overall shield, Belden Part # 9995.
Connectors: AMP DB50 (Amp Part # 205211-2) with metal shell (Amp Part # 745175-2) and socket contacts (Amp Part # 66505-3) on each end.
Signal: DC to 2 MHz. (Consists of a detector electronics signal having a 200 nSecond Rise-times).
Length: 6 Feet

5. **N/A**

6. **CDMS Crate DC Power Connections:** 1 Set per CDMS Crate V2, 12 wires per set
Fermi Drawing # Fermi DWG: xxxx-EE-387319: ITEM 1
Cable: Chassis wiring cable, 14 AWG, Belden Part #
Connectors: AMP Part # 324082 connected to crate tabs at one end, AMP Part # 324045 connected to Crate power tap connections.
Signal: DC
Length: 6 "– 10"

7. **N/A**

8. **Computer to GPIB Interface Cable:** (Black Box Part # EXN02IEEE-488) 1 required
Cable: 25 twisted pair, 24 AWG, individually shielded pairs with overall shield, Amphenol Part # 9995.
Connectors: AMP Type IEEE-488
Signal: Address and Data pulses.
Length: 10 Feet

9. **GPIB Interface to FE and DAQ Subracks, Cable:** (Black Box Part # EXN02IEEE-488) 1 required
Cable: 32 twisted pair, 28 AWG, flat ribbon cable, Amphenol Part # 843-132-2801-064.
Connectors: Panduit 120-964-455
Signal: Address and Data pulses.
Length: 6 Feet

10a. **GPIB Optical Link:** 1 required
Cable: # conductors (Mfg. Part # ? ? ?)
Connectors: Mfg. Part # ? ? ?
Length: 50 Feet.

10b. **Steel Nipple ½''diameter by approximately 6" long.**

The fiber optic cable will enter the RFI/EMI Enclosure via this ½" steel pipe nipple.
Mounted on 12c.

11. **Stripline:** 42 required
Cable: Flexible Printed circuit, 50 conductors (Mfg. Part # ? ? ?)
Connectors: Mfg. Part # ? ? ?
Length: approximately 15 feet.

12a. **Muon Veto Cables(Signal):** 60 plus 40 Spares
Cable: RG58/U, Green outer jacket, Fermilab Stock # 1170-034000.
Connector: standard BNC connector at each end
Signal: <5 Volts and <350 MHz.
These Cables enter the RFI/EMI Enclosure via a 3" EMT, which is welded, or Brazed to a 3/16" plate mounted in the RFI/EMI Enclosure wall. At the wall, 8" of the outer jacket of each of the RG58/U cables is stripped away, and the entire bundle of cable is clamped together with two hose clamps making sure the cables are parallel to each other, and that all 100 shields are in electrical contact with each other. The space between the bundle of bare shields and the inner wall of the 3" EMT is to be filled with conductive wool so that electrical contact is made between the EMT inner wall and the cable shields.
Length: ? ? ? feet

12b. **Muon Veto Electrical Metallic Tube(EMT):** (3" EMT about 4 feet long).
This tube will protrude into the RFI/EMI Enclosure about 1", and outside the enclosure about 4 feet, with the intent of opening up under the racks, located on the raised floor, in the second floor equipment room.
Mounted on 12c.

12c. **Muon Veto (EMT) Plate:** (3/16" steel, 12" vertically by 18" horizontally).
Fermilab Drawing # XXXX-MC-387304
This plate will have two pieces of 3" diameter EMT welded or brazed to it. Each tube will protrude into the RFI/EMI Enclosure about 1" and outside the enclosure about 4 feet, with the intent of opening up under the racks, located on the raised floor, in the second floor equipment room.

13a. **Muon Veto Cables(High Voltage):** 60 plus 40 Spares.
Cable: RG58/U, Red outer jacket. Fermilab Stock #1170-036000
Connector: Kings SHV connector at each end. (Kings Part # 1705-2)
Signal: <2500 Volts DC.
These Cables enter the RFI/EMI Enclosure via a 3" EMT, which is welded, or Brazed to a 3/16" plate mounted in the RFI/EMI Enclosure wall. At the wall, 8" of the outer jacket of each of the RG58/U cables is stripped away, and the entire bundle of cable is clamped together with two hose clamps making sure the cables are parallel to each other, and that all 100 shields are in electrical contact with each other. The space between the bundle of bare shields and the inner wall of the 3" EMT is to be filled with conductive wool so that electrical contact is made between the EMT inner wall and the cable shields.
Length: ? ? ? feet.

13b. **Muon Veto Electrical Metallic Tube(EMT):** (3" EMT about 4 feet long).
This tube will protrude into the RFI/EMI Enclosure about 1", and outside the enclosure about 4 feet, with the intent of opening up under the racks, located on the raised floor, in the second floor equipment room.
Mounted on 12c.

14a. **Cryogenic, Data Acquisition Cable** (Inside the RFI/EMI Enclosure): 20 required.
Cable: 12 twisted pair, 24 AWG, Zo = 100 ohms, 13.5 pF/ft, individually shielded pairs with overall shield, Belden Part # 9734.
Note; Because Belden Part # 9734 has a diameter too large for the AMP, Cable strain relief, Belden Part # 89734 should be used instead. Belden Part #89734 has similar electrical characteristics; is Plenum rated and has a cable diameter, which will fit the AMP Part# 745173-1, cable strain relief.
Connectors: AMP DB25 (Amp Part # 207463-1) with a metal shell (Amp Part #'s 745173-1) and socket contacts (Amp Part #'s 66505-3) on one end and AMP DB25 (Amp Part # 207464-1) with a metal shell (Amp Part #'s 745173-1) and pin contacts (Amp Part #'s 66507-3) on the other.
Signal: DC to 1 kHz.
Length: ? ? ? feet.

14b. **Cryogenic, Data Acquisition Cable** (Outside the RFI/EMI Enclosure): 20 required.
Cable: 12 twisted pair, 24 AWG, Zo = 100 ohms, 13.5 pF/ft, individually shielded pairs with overall shield, Belden Part # 9734.
Note; Because Belden Part # 9734 has a diameter too large for the AMP, Cable strain relief, Belden Part # 89734 should be used instead. Belden Part #89734 has similar electrical characteristics; is Plenum rated and has a cable diameter, which will fit the AMP Part# 745173-1, cable strain relief.
Connectors: AMP DB25 (Amp Part # 207463-1) with a metal shell (Amp Part #'s 745173-1) and socket contacts (Amp Part #'s 66505-3) on one end and AMP DB25 (Amp Part # 207464-1) with a metal shell (Amp Part #'s 745173-1) and pin contacts (Amp Part #'s 66507-3) on the other.
Signal: DC to 1.kHz..
Length: ? ? ? feet.

14c. **Cryogenic, Data Acquisition Cable, RFI/EMI Enclosure Filter:** (Spectrum Control Inc. type E, 4000 pF, Part # 56-725-005) ? 20 required + 2 Spares.
Fermilab Drawing # XXXX-MD-387303 Rev. A

These filters are to be mounted on a 3/16" brass plate, which is 12" vertically and 18" horizontally, in 5 rows of 4. The shell is electrically bonded to the brass plate. These connectors are to be mounted so that the pin contacts are on the inside of the RFI/EMI Enclosure, and the socket contacts are on the outside.
Signal: DC to 1 kHz

15a. **Scintillation Calibration Fibers:** 60 plus 40 spares required.
Cable: # conductors (Mfg. Part # ? ? ?)
Connectors: Mfg. Part # ? ? ?
Length: 50 Feet.

15b. **Steel Nipple 1" diameter by 12"long:** 1 required
The bundle of Scintillation fiber optic cables will enter the RFI/EMI Enclosure via this steel pipe nipple.
Mounted on 12c.

16a. **RTF Crate DC Power Cable Assembly** (Electronics Room): 4 required
Fermilab Drawing: CDMS RTF Power Supply to Crate DC Power Cable
Cable: 6 conductors of 8 AWG (Belden Part # 9908), 84 strands of AWG 27, tinned copper, PVC insulated.
Connectors: Amphenol Model # 97-3106A-24-10P at one end; AMP Part # 324082 connected to crate tabs.
Voltages and Currents: +15 Volts at 15 mA, +15 Volts at 15 Amps and –15Volts at 15 Amps. AWG 8 wire has a resistance of 0.628 milliohms per foot. At 11 amperes, 80 feet of this wire develops a voltage drop of 0.553 volts.
Length: 8 feet.

16b. **RTF Crate DC Power Cable Assembly** (Electronics Room): 4 required.
Fermilab Drawing: CDMS RTF Power Supply to Crate DC Power Cable
Cable: 6 conductors of 8 AWG (Belden Part # 9908, 84 strands of AWG 27, tinned copper, PVC insulated).
Connectors: Amphenol Model # 97-3106A-24-10p at one end; AMP Part # 324082 connected to crate tabs.
Voltages and Currents: +5 Volts at 11Amps., +15 Volts at 15 Amps and –15Volts at 15 Amps. AWG 8 wire has a resistance of 0.628 milliohms per foot. At 11 amperes, 80 feet of this wire develops a voltage drop of 0.553 volts.
Length: 8 feet

17. **RTF Crate DC Voltage and Current Sense Cable:** (Electronics Room): 4 required.
Fermilab Drawing: CDMS RTF Crate DC Voltage Sense Cable
Cable: 18 twisted pair, 24 AWG(7x32), 24 ohms/1000', Zo = 100 ohms, 12.5 pF/ft, individually shielded pairs with overall shield, Belden Part # 8118
Connectors: AMP DB37 (Amp # 205209-2) with metal shell (Amp Part # 745174-2), socket contacts (Amp Part # 66505-3) on one end and AMP DB37 (Amp # 205210-2) with metal shell (Amp Part # 745174-2), pin contacts (Amp Part # 66507-3) on the other end.
Signal: DC to 1 kHz.
Length: 8 feet.

18. **RTF Backplane to Slow ADC Cable:** (Electronics Room): 16 required.
Fermilab Drawing: CDMS RTF Backplane to Slow ADC Cable
Cable: 96 conductor ribbon cable, 30 AWG(7x38), 103 ohms/1000', Zo = 97.5 ohms, 21.7 pF/ft, propagation = 1.27 nS/foot, ITW/Pancon Part # 099F30V96CR or ERNI Part # 913049
Connectors: Ribbon Cable Connector (ERNI Part # 913031 or ITW/Pancon 120-96-435F).
Signal:
Length: 8 feet.

19. **RTF Scaler Cable:** (Electronics Room): 8 required.
Fermilab Drawing: CDMS RTF Scaler Cable
Cable: 34 conductor ribbon cable, 30 AWG(7x38), 103 ohms/1000', Zo = 97.5 ohms, 21.7 pF/ft, propagation = 1.27 nS/foot, 3M Part # 3365/34 or Spectra-Strip Part # 843-191-2801-034
Connectors: AMP Ribbon Cable Connector (AMP Part # 746288-8) with strain relief (AMP Part # 499252-8).
Signal: DC to 1 kHz.
Length: 8 feet.

20. **RTF front panel to Fast ADC's Cable:** (Electronics Room): (AMP Part # 137131-1) 42 required.
Fermilab Drawing: CDMS RTF front panel to Fast ADC's Cable
Cable: 6 conductor flat coax cable, 50 ohm
Connectors: AMP Flat Coax Connector (Amp # 226298-6 on one end and Lemo Coax Connector (Lemo # FFA.00.250.CTA27) on the other end.
Signal: DC to 1 kHz.
Length: 4 feet.

21. **RTF Crate Left and Right Trigger Conditioner Backplane Cable:** (Electronics Room): 8 required.
Fermilab Drawing: CDMS Left and Right Trigger Conditioner Backplane Cable
Cable: 50 conductor ribbon cable, 30 AWG(7x38), 103 ohms/1000', Zo = 97.5 ohms, 21.7 pF/ft, propagation = 1.27 nS/foot, 3M Part # 3665/50 or Spectra-Strip Part # 843-191-2801-050
Connectors: AMP D-Sub (Amp # 746789-1) on one end and AMP ribbon cable connector (AMP Part # 1-746288-0) with strain relief (Amp Part # 499252-4), or 3M ribbon cable connector (3M Part # 3425-6650) with included strain relief on the other end.
Signal: DC to 1 kHz.

Length: 4".

Revisions:
1a. Added drawing name, wj
1b. Added drawing name, wj
2a.a. Added drawing name, changed Length specification, changed connector information. wj
2a.b. Added drawing name, changed Length specification, changed connector information. wj
2b.a. Added drawing name, changed Length specification, changed connector information. wj
2b.b. Added drawing name, changed Length specification, changed connector information. wj
16a. Added RTF Crate DC power Cable Assembly information, wj
16b. Added RTF Crate DC power Cable Assembly information, wj
17 Added RTF Crate DC Voltage and Current Sense Cable information, wj
18 Added RTF Backplane to Slow ADC Cable information, wj
19 Added RTF Scaler Cable information, wj
20 Added RTF front panel to Fast ADC's Cable information, wj
21 Added RTF Left and Right Trigger Conditioner Backplane Cable information, wj
6 Added information about crate power cables, wj

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